CLAIMS

1. An air conveyor,

comprising traction means (60) mobile in translation on themselves to drive around a closed loop circuit, pendle arms (3) for suspending sequential loads on the traction means for transporting them along a forward portion of said circuit in a conveyor line going from a loading station where they are individually picked up, each by at least one pendle arm, to an unloading station where they are released therefrom,

wherein said arms (4) are connected to said traction means, in fixed positions regularly distributed along the latter, by articulated assembly devices allowing them, each at a so-called proximal end, to pivot in the vertical plane of the circuit, about an articulation pin perpendicular to said plane,

and wherein means are provided for controlling the orientation of each arm about said articulation pin while its free end executes a complete rotation in space while traveling along said closed loop circuit, between a position in which it is oriented freely hanging vertically at the exit of the unloading station, an intermediate position in which it is tilted toward said traction means when it returns empty backward from the unloading station to the loading station, and a position in which it is again oriented freely hanging vertically on its arrival at the loading station.

2. The air conveyor as claimed in claim 1, applied to the conveyance of sleds sequentially transporting objects such as car bodies in the car industry, said loads then each consisting of a sled carrying such a car body, which is picked up from an upstream conveyor on the ground bringing it via a device such as roller tables (71, 72) to the loading station, and deposited at the unloading station onto another device such as roller tables by which it is taken by a downstream conveyor on the ground.

3. An air conveyor for the conveyance of sleds for sequentially transporting objects such as car bodies in the car industry,

comprising traction means (60) associated with motive means controlling their movement in translation on themselves to drive along a closed loop circuit, pendle arms (3) for suspending sleds to transport them along a forward portion of said circuit along a conveyor line going from a loading station where they are individually picked up on an upstream conveyor on the ground upstream, each by at least one pendle arm, to an unloading station where they are released therefrom and deposited onto a downstream conveyor on the ground,

wherein said arms (4) are connected to said traction means, in fixed positions regularly distributed along the latter, by articulated assembly devices allowing them, each at a so-called proximal end, to pivot freely in the vertical plane of the circuit, about an articulation pin perpendicular to said plane,

and wherein means are provided for guiding a free distal end of each arm, at a distance from its so-called proximal end, on at least a portion of its path during its tilting about said articulation pin between a position in which it is oriented freely hanging vertically at the exit of the unloading station, and a position in which, after having executed a complete rotation in space by rotation relative to the path of the traction means about its articulation pin on the latter, it is again oriented freely hanging vertically on its arrival at the loading station,

and supporting members to receive said arms in an intermediate position in which they are tilted along said circuit, in a return portion of said closed loop circuit bringing said arms empty backward from the unloading station to the loading station.

4. The conveyor as claimed in any one of claims 1 to 3, wherein said traction means consist of at least one cable (60), also carrying the loads, which is kept tensioned on guide wheels (61, 62, 63) defining its path along said closed loop circuit, said path advantageously being horizontal in its return portion bringing the

load-suspending arms empty backward from the unloading station to the loading station.

5. The conveyor as claimed in claim 4, wherein said return portion of the closed loop circuit is situated above the forward portion defined by said guide wheels along the conveyor line, and wherein are provided, to control the orientation of the arms (4) about their respective articulation pins on the traction means, supporting members (20) which are secured to said traction means (60) and distributed on the latter in order that each receives one of said arms respectively when it tilts down thereon, by its own weight, when returning empty backward from the unloading station to the loading station.

6. The conveyor as claimed in any one of the preceding claims, wherein said traction means comprise two similar cables, which are kept tensioned parallel to one another on guide wheels and driven in synchronism along said closed loop circuit, along respective paths defined by guide wheels specific to each either side of said vertical plane, and wherein the two cables are coupled by articulated assembly devices between said arms and said cables, each of these devices being rigidly connected to the two cables of the conveyor at the ends of the articulation pin of the corresponding arm, which thus circulates hanging between the guide wheels of the cables in said forward portion of the closed loop circuit.

7. The conveyor as claimed in claim 6, wherein, to control the orientation of the arms (4) about their respective articulation pins on said cables, support members (20) are provided which are secured to said cables (60) and distributed on the latter so as to each receive one of said arms respectively when it tilts down thereon, by its own weight, when returning empty backward from the unloading station to the loading station, said support members being secured to the two traction carrier cables.

8. The conveyor as claimed in claim 5 or 7, wherein each support member (20) is distinct from the articulated assembly device

(40) of the pendle arm that it must receive and situated on said traction means sufficiently close to this device, after it in the direction of circulation, to cause an inclination of the arm at the exit of the unloading station, at the passage of a return curve which the path of said traction means comprises to conduct them from the forward circuit portion to the return backward circuit portion, said return portion being situated above said forward portion.

9. The air conveyor as claimed in any one of the preceding claims, comprising a ramp for retaining the distal end of the pendle arms on the approach to the loading station, to guide a progressive station of each arm about its articulation pin of the assembly device, where the traction means follow a return curve conducting them from the return circuit portion to the forward circuit portion, said return portion being situated above said outward portion.

10. The conveyor as claimed in claim 9, wherein said ramp is formed to conduct each arm into a position inclined rearward on the approach to the loading station until leaving it freely hanging vertically at the loading level.

11. The air conveyor as claimed in any one of the preceding claims, wherein each arm has at its distal end a hook open rearward in the direction of circulation of the pendle arms to interact with a handle of a sled for transporting the loads with which it engages at the loading station, while the sled is carried more rapidly in a zone of overlap with an upstream conveyor on the ground, and from which it disengages at the unloading station, while the sled is slowed down, if not stopped, on a module of a downstream conveyor on the ground.

12. The conveyor as claimed in claim 11,

wherein said traction means consist of at least one cable (60), also carrying the loads, which is kept tensioned on guide wheels (61, 62, 63) defining its path along said closed loop circuit, in which said portion for returning said arms circulating empty from the unloading station to the loading station runs horizontally above said forward conveyor portion,

and wherein are provided, on the one hand at the loading station, a ramp for retaining a distal end of each arm at a distance from its proximal end, which guides its swingly rotating about a return curve of the cable which returns it from the return backward portion of the circuit to the forward portion, so as to bring it oriented rearward to release it freely hanging vertically in a position in which its hook is presented in front of a handle interacting with a sled brought by an upstream conveyor on the ground,

and means for guiding the tensioned cable thereby causing it to rise in two steps, first to engage the handle by imprisoning it in the hook, then to raise the sled while disengaging it from the upstream conveyor on the ground,

and on the other hand, at the unloading station, means for guiding the tensioned cable to lower each arm to a level where the sled first comes to rest on a downstream conveyor on the ground, while the arm reaches a position of disengagement from the handle, from which the arm is lifted freely hanging vertically,

and means for causing a progressive inclination of the arm forward when the cable describes a return curve conducting it to said return portion of the circuit,

these inclination means advantageously consisting of support members secured to the cable, disposed to receive individually each arm in said intermediate position when it tilts down onto said cable under the effect of its own weight when returning empty backward from the unloading station to the loading station.

13. The conveyor as claimed in claim 12, wherein the arms are rotated by a pivoting movement of each arm at its distal end for substantially a quarter turn at the exit of the unloading station, to pass from the vertical orientation to the intermediate orientation in tilted position on the circuit, and by a reverse rotation movement of each arm, at its distal end relative to said proximal end, of three quarters of a turn on the approach to the loading station.

14. A conveyor installation comprising two symmetrical conveyors as claimed in any one of the preceding claims, operating in synchronism for the transport of car bodies resting on sleds which are suspended individually on traction carrier cables each by four independent pendle arms.

15. The installation as claimed in claim 14 wherein each of the conveyors comprises two cables circulating in parallel and coupled via articulated assembly devices of the pendle arms.

16. The installation as claimed in claim 15 wherein, along the forward portion of the circuit followed by the cables, the arms are hanging between the respective guide wheels of the two cables defining said closed loop circuit.

17. The installation as claimed in any one of claims 14 to 16, wherein the air conveyor overlaps, at the two ends of the installation, with an upstream conveyor on the ground at the loading station on the one hand, with a downstream conveyor on the ground at the unloading station on the other hand, for a length corresponding to the total of two sled modules in the course of transport, where the conveyors on the ground are fitted with means for varying the driving speed of the sleds, in connection with a path of the cables causing the hooks of the pendle arms to descend beneath the interacting handles of the sleds in order to raise them thereafter.

18. An installation comprising two symmetrical conveyors operating in synchronism for the transport of car bodies resting on sleds which are suspended individually on traction means of each conveyor, each by four independent pendle arms, respectively two per conveyor, wherein said traction means consist of cables which are also carriers for the loads suspended thereon by said arms, and wherein

said cables are kept tensioned and made to describe by translation on themselves a closed loop circuit situated in a vertical plane and comprising a foward portion of said circuit following a foward conveyor line from a loading station where the sleds with their

bodies are individually picked up on an upstream conveyor on the ground to an unloading station where they are released therefrom and deposited on a downstream conveyor on the ground, and a portion for returning the arms circulating empty from the unloading station back to the loading station running above said forward portion,

said arms are mounted articulated in fixed positions distributed along said cables by respective assembly devices allowing them, each at a so-called proximal end, to pivot freely in the vertical plane of the circuit, about an articulation pin perpendicular to said plane, so that, on the return portion of the circuit, the pendle arms circulating empty are tilted down, by their own weight, along the cable to which they are assembled, to each rest on an associated support member secured to the latter,

each support member is disposed on said cable so as to guide a pivoting of the corresponding arm through a quarter turn at the exit of the unloading station, while pushing it in progressive inclination forward, from a position in which it is freely hanging vertically along the forward portion of the circuit, when the cable describes a return curve conducting it to said return portion of the circuit,

and at the loading station, a fixed ramp is provided for retaining the distal end of each arm which guides its tilting, while retaining the arm inclined rearward, when it passes around a return curve which conducts the corresponding cable from the return portion of the circuit to the forward portion, each arm thus passing progressively from its tilted orientation along the circuit in its return portion to a position in which it is again freely hanging vertically at the loading station.

19. The installation as claimed in claim 18,

wherein each of the two conveyors comprises two similar cables, which are kept tensioned parallel to one another on guide wheels and driven in synchronism along said closed loop circuit, following respective paths defined by guide wheels specific to each either side of said vertical plane,

and wherein a coupling is provided between the two cables of each conveyor,

on the one hand, at each pendle arm, by the articulated assembly devices between said arms and said cables, each of these devices being rigidly connected to the two cables of the conveyor by grips clamped onto the cables at the opposite ends of the articulation pin of the corresponding arm, which circulates thus hanging between the respective guide wheels of the cables in said forward portion of the closed loop circuit,

on the other hand, at the various support members, the latter interacting by rolling contact each with the arm which precedes it, between two grips for attaching to the two cables respectively.